



Comparison of Problem-Based Learning and Discovery Learning Model

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<http://dx.doi.org/10.18415/ijmmu.v7i3.1564>

Abstract

This study aims to compare the problem-based learning and discovery learning models in terms of curiosity, high-level thinking skills, and student competencies. This research is a quantitative study using a quasi-experimental design. The population in this study were 270 students, while for a sample of 90 students were taken by side random technique. The method of data collection is done by interviews, observations, documentation, and questionnaires. Analysis of the data used is descriptive and inferential statistics. The results showed that the problem-based learning model was more effective than the discovery learning model in terms of curiosity, the problem-based learning model was as effective as the discovery learning model in terms of high-level thinking ability, and the problem-based learning model was more effective compared to discovery learning model learning in terms of student competencies. Based on the results of the study, it can be concluded that the problem-based learning model is more effective than the discovery learning model in terms of curiosity and student competencies, but in terms of high-level thinking ability both problem-based learning and discovery learning models provide effective effectiveness same.

Keywords: *Learning Model; Problem Based Learning; Discovery Learning; Students*

Introduction

The era of globalization that occurs at this time requires improving the quality of competencies possessed by human resources. In 2020 Indonesia will be in a demographic period, during which time it will have a positive impact if young people are equipped with the necessary competencies in the future. Owned competence, is expected to be used to compete with human resources from other countries that have been looking for work in Indonesia. Competency improvement will be more appropriate given to young people, because young people have a high awareness to improve their competence, always follow the development of science to support competence and be more sensitive to the surrounding environment.

At the Vocational School level, especially in the accounting and finance study programs of institutions there are basic accounting subjects in the adjusting journal material. An adjustment journal is a journal used to adjust an account to its actual state so that relevant financial statements (accounting information) will appear.

Based on the observations made, it reinforces that the achievement of learning outcomes of the three aspects, namely affective (curiosity), psychomotor (high-level thinking ability), and cognitive (competency) of students in SMKN 1, 3 and 6 Sukoharjo have not been maximized, causing the learning objectives not achieved maximally and affect the quality of student competencies. In implementing the 2013 revised 2017 curriculum, the government suggested several learning models, namely research-based learning using problem-based learning, project-based learning, discovery learning and inquiry models that are regulated in Minister of Education and Culture Regulation No. 22 of 2016 concerning Primary and Secondary School Process Standards.

The problem-based learning model is a method for building and training someone to learn by using problems as a stimulus in thinking and focusing on the activities of students (Manoe, 2020). The Problem Based Learning (PBL) learning model is learning that uses real problems (authentic) that are not structured (ill-structured) and are open as a context for students to develop skills, solve problems and think critically while building new knowledge.

Some research conducted on the Problem Based Learning (PBL) learning model conducted by Rahmah et al (2019) states that PBL can improve students' mathematical critical thinking skills and students' curiosity. Mairani and Simatupang (2018) in their research stated that there was an influence between the use of PBL models on the learning outcomes of high-level cognitive domains of students on the subject of heat temperature. In contrast, research conducted by Magdalena et al (2014) states that PBL and inquiry models do not affect learners' learning achievement. The study is refuted by Aulyana et al (2017) which states that the use of LKPD content-oriented complexity and cognitive processes in the problem-based learning model of learning has a positive influence on the achievement of students' physical competence. According to Pratiwi et al (2017) with PBL model aided by LKS physics, heat material and shape changes with a scientific approach can improve the learning outcomes of knowledge in the medium category, can also develop characters, especially honest, discipline, curiosity and communicative as well as improve the learning outcomes of skills in the medium category.

According to the Education and Culture Human Resources Development Agency and Education Quality Assurance, Ministry of Education and Culture, the discovery learning method is a learning process that occurs when students are not presented with lessons in their final form, but it is expected that students organize themselves. According to Widiaworo (2018) Discovery Learning is a learning model that emphasizes the concept of knowledge itself ". Discovery learning places more emphasis on the discovery of concepts of knowledge that were previously unknown to students. HOTS-based discovery learning models succeed in improving self-concept and student learning outcomes in social studies learning at SMPN 1 Enam Lingkungan (Abral et al., 2018). According to Masril et al (2018) the use of virtual lab-based discovery learning models can help students improve their attitudes, knowledge and skills competencies at a significance level of 95%.

The same thing also happened in research conducted by Haeruman et al., (2017) which focused on researching the effect of discovery learning models on improving mathematical critical thinking skills in terms of students' initial mathematical abilities, this study is based on problems that assume mathematics is a subject difficult to do and the use of learning models that are less related to everyday life, the results of the study show that the ability to think critically mathematically increased by being given a discovery learning model rather than using conventional learning models.

Research conducted by Friyanto et al., (2016) states the opposite, that students' high-level thinking skills after learning using discovery learning models are still not maximal, there may be other factors that make students difficulty in thinking at a high level of material opportunities and these factors are not in the indication of the problem in this study. The study is refuted by research conducted by Seda et al (2019) there are differences in affective domain learning outcomes between learners who learn by

using mind mapping based discovery learning models and students who learn to use conventional models, there are differences in psychomotor domain learning outcomes between participants students who learn by using mind mapping based learning models with students who learn using conventional models, there are differences in cognitive learning outcomes between students who learn by using mind mapping based discovery learning models with students who learn to use conventional models, and there are interactions between learning models based on mind mapping based learning towards student learning outcomes.

In accounting learning requires a change (innovation) learning model that can improve the three aspects of learning outcomes in the form of curiosity, high thinking ability and student competence. New value (Novelty) in this study is a comparison of problem-based learning models with discovery learning in accounting subjects. This study aims to compare the problem-based learning and discovery learning models in terms of curiosity, high-level thinking skills, and student competencies.

Literature Review

According to Saifudin (2016), learning can be interpreted as the process of adding knowledge and insight through a series of activities carried out consciously by someone and cause changes in him so that changes occur in a positive nature, and in the end will be able to get new skills, skills, and knowledge. Basic accounting is a subject that discusses the accounting cycle which consists of recording, classifying, summarizing, and making financial statements.

Basic accounting learning is a process of interaction between students and teachers to learn the accounting cycle so that students will have the competence to make financial information in the form of financial statements. In accordance with Kyriacou's opinion (2009) Effective teaching can be defined as teaching that successfully achieves the learning by pupils intended by the teacher. In essence, there are two simple elements to effective teaching: (1) the teacher must have a clear idea of what learning is to be fostered, (2) a learning experience is set up and delivered that achieves this.

Things that indicate that a teacher must determine the learning objectives first then determine the plan to identify, select, and arrange experiences to ensure the achievement of appropriate results. the effectiveness of accounting learning is the level of achievement of accounting learning goals that have been determined before starting learning. The level of achievement of accounting learning objectives is indicated in the average score of all students adjusted to the minimum learning completeness (KBM).

In this study, the effectiveness of accounting learning at SMK Sukoharjo is determined by schools with a KBM value of 75. Competence has a broad meaning, according to Guthrie (2009) competence is to build a person in the context of a particular work and workplace. According to Winterton (2009) competence is a characteristic possessed by an individual to provide the best results in his work ". An adjustment journal is a journal created to adjust an account to its actual balance until the end of the accounting period. The purpose of making an adjusting entry is to determine and recognize assets, debts, income and expenses appropriately and correct the mistakes made. It can be concluded that the competence of students in adjusting journal material is a characteristic possessed by a student with regard to the combination of knowledge, skills and attitudes in making adjusting journals. Indicators of student competency according to Mulyasa (2009) are knowledge, skills and attitudes.

According to Mc Elmeel (2002), curiosity is a desire to carry out learning activities, investigate and know a thing. Curiosity owned by students will lead to creativity in exploration (exploration) or inquiry (inquiry). According to Faradella (2018) Curiosity is as a willingness to explore something that is not yet known, meet new things and accept uncertainty ". In learning activities students' curiosity can be improved by creating a classroom environment full of the process of discovery or investigation rather

than activities that are concerned with results. Indicators of curiosity that can be taken based on the above theory exposure are reading, asking and searching.

According to Lewis & Smith (1993) the ability to think at a high level (HOTS) is the thinking skills of students in obtaining new information and stored in their memory, then combining and conveying it for the intended purpose ". Bloom's Taxonomy provides the concept of high-level thinking, by classifying the level of thought processes from the lowest level to the highest level. The six taxonomic levels are knowledge comprehension, application, synthesis, and evaluation. The first and second levels are considered as low-level thinking skills, while the other four levels are high-level thinking skills.

According to Kusumaningtias (2013), Problem-based learning is a learning that uses contextual problems that occur in the environment. According to Trianto (2007) Problem Based Learning is a learning approach where students are confronted with real problems and can compile their own knowledge, develop high-level skills, make students more independent and increase student confidence. According to Huriah (2018), PBL learning model also has advantages and disadvantages, PBL strengths are: (1) PBL is student-centered, motivates active learning, increases understanding, and stimulates a person to continue learning throughout his life. (2) General competence, PBL facilitates students to develop the desired attitudes and general skills in the future. (3) Integration, PBL facilitates the integration of the core curriculum. (4) Motivation, PBL is fun for tutors and students by involving students in the learning process. (5) In-depth learning, PBL increases the ability of deep understanding for students. (6) Constructive approach, active learners based on knowledge and build a conceptual framework of that knowledge.

As for the shortcomings of problem-based learning, namely: (1) Tutors who cannot teach, tutors feel comfortable with traditional models so that the possibility of PBL will feel boring and difficult. (2) Human resources, more staff are involved in the process of this tutorial. (3) Other sources, most students need access to the same library and the same internet. (4) Role models, the possibility of students experiencing a lack of access to quality teachers wherein the traditional curriculum provides learning in large groups. (5) Information overload, students may not be sure of how much independent learning is needed and what information is relevant and useful.

Hosnan (2014) said that discovery learning is a model of active thinking learning by finding, investigating by itself so that the process and results will last long in the memory. According to Kurniasih & Sani (2014) the discovery learning model is a learning process that occurs when lessons are not presented in their final form, but it is expected that students organize themselves. Meanwhile, according to Suherman (2001), there are several advantages or advantages of discovery learning methods, namely: (1) active students in learning activities because students think and use the ability to find the final results; (2) Students understand the lesson material correctly because they have experienced the process of finding it themselves. Something obtained this way takes longer to remember; (3) Cause a sense of satisfaction with independent learning. This inner satisfaction drives him to make inventions again so that his interest in learning increases; (4) Students who acquire knowledge using the discovery method will be better able to transfer their knowledge to various contexts; (5) This method trains students to learn more by themselves. Weaknesses of the discovery learning model according to Kurniasih & Sani (2014), namely: (1) This method raises the assumption that there is a readiness of the mind to learn. For students who are less clever, will have difficulty abstracting or thinking of expressing the relationship between written or oral concepts, which in turn will cause frustration; (2) This method is not efficient for teaching large numbers of students, because it takes a long time to help them find theories for other problem solving; (3) Expectations contained in this method can be damaged if dealing with students and teachers who are familiar with the old way of learning; (4) In some scientific disciplines, for example, IPA (Science Study) lacks facilities to measure ideas expressed by students. (5) Students do not have the opportunity to think because they have been chosen by the teacher.

Methods

This research is a quasi-experimental type of research that uses three different groups of students, one group as a control group and two groups as an experimental group (problem-based learning and discovery learning). The purpose of this study was to determine the comparison of problem-based learning and discovery learning models in terms of curiosity, high-level thinking skills, and student competencies.

The population in this study were all class X students in 2019/2020 Academic Year in the even semester, which consisted of 9 classes in 3 Sukoharjo State Vocational Schools. The number of students in each class consists of 30 students, so the total population is 270 students. Sampling was done by random sampling. Samples are taken randomly by drawing students in each class because it is considered students from all three classes have the same ability. The sample in this study were 90 students. In this study using descriptive statistical analysis techniques and inferential statistical analysis.

Results and Discussion

Data collection was carried out from January to February 2020 in State Vocational Schools 1, 3, and 6 Sukoharjo in order to obtain data in the form of curiosity (questionnaire filling), the ability to think at a high level and the competence of students before and after being treated which can be seen from the results of adjusting journal tests, the learning process by using the PBL model in the experimental class 1 and the DL learning model in the experimental class 2.

To test the research instrument, it will first be tested for validity and reliability. Validity Test to find out whether the items made really measure what should be measured. Test the validity of each question using the Product Moment correlation formula from Pearson. All question items of all variables have a correlation coefficient greater than the critical value ($r_{\text{arithmetic}} > r_{\text{table}}$) so that it can be said that all question items are valid. The instrument reliability test in this case aims to test the extent to which the measurement tools from the questionnaire compiled can be trusted or relied upon. The results of the reliability test calculations can be seen that the instrument is reliable because each has an alpha Cronbach value > 0.6 , meaning that the measuring instrument used is appropriate and reliable.

Hypothesis testing begins with the prerequisite test first, while the prerequisite tests conducted are homogeneity test and normality test. A homogeneity test is done to prove whether the research data shows the same ability of each research group, while the normality test is done to find out whether the research data is normally distributed or not.

The effectiveness of the learning model in terms of Curiosity

Curiosity data in this study uses ordinal data so that the average difference test to be used is the non-parametric test, the Mann-Whitney test. The Mann-Whitney test output is presented in Table 1.

Table 1. Mann-Whitney Test
Test Statistics^a

	Data
Mann-Whitney U	375.000
Wilcoxon W	840.000
Z	-2.315
Asymp. Sig. (2-tailed)	.021

a. Grouping Variable: Kelas

Based on the "Test Statistics" output in the Mann-Whitney test in Table 1, it is known that the Asymp value. Sig. (2-tailed) of 0.021 (smaller than <0.05 probability value), therefore it can be concluded that there are significant differences between the problem-based learning and discovery learning classes in terms of Curiosity.

The effectiveness of the learning model in terms of the ability to think at a high level

The normality test is a prerequisite for analysis before inferential statistical analysis. It is known that the Sig probability value of the problem based learning discovery learning class is 0.03 and the discovery learning class is 0,000 and both the model Sig's probability values are less than 0.05 so that the two classes are not normally distributed, so that the nonparametric test will be tested. Mann-Whitney test.

Table 2. Mann-Whitney Test
Test Statistics^a

	Data
Mann-Whitney U	434.500
Wilcoxon W	899.500
Z	-.239
Asymp. Sig. (2-tailed)	.811

a. Grouping Variable: Kelas

Based on the "Test Statistics" output in the Mann-Whitney test in Table 2, it is known that the Asymp value. Sig. (2-tailed) of 0.811 (greater than >0.05 probability value), therefore it can be concluded that there is no significant difference between the problem based learning class and the discovery learning class in terms of high-level thinking ability.

The Effectiveness of the Learning Model Judging from the Competence of Students

Normality test on students' competencies is carried out before inferential statistical analysis. Sig probability value of the problem based learning class and discovery learning class is 0.032 and 0.025 and both values are less than 0.05, it causes both classes are not normally distributed, because it does not meet the normality assumption so that nonparametric tests will be carried out, namely the Mann-Whitney test.

Table 3. Mann-Whitney Test
Test Statistics^a

	Data
Mann-Whitney U	126.500
Wilcoxon W	591.500
Z	-4.869
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: Kelas

Based on the "Test Statistics" output in the Mann-Whitney test in Table 3, it is known that the Asymp value. Sig. (2-tailed) of 0,000 (smaller than <0.05 probability value), therefore it can be concluded that there are significant differences between the problem based learning class and the discovery learning class in terms of student competency.

Conclusion

In terms of curiosity, the use of problem-based learning models is more effective than discovery learning models, this can be seen from the acquisition of Asymp values. Sig. (2-tailed) for the problem-based learning model of 0.317 and the discovery learning model of 0.085. In terms of high-level thinking ability, the use of problem-based learning models and discovery learning models provide the same effectiveness, this is reinforced by the Asymp values. Sig. (2-tailed) of 0,000 for both models. In terms of student competency, the use of problem-based learning models is more effective than discovery learning models, this can be seen from the acquisition of Asymp values. Sig. (2-tailed) for the problem-based learning model of 0.020 and the discovery learning model of 0.001.

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